

American
Gold Series[®]

Operator's Manual

Rec'd 4/95 1/6/95

Gravity Convection Ovens

DS 44

DS 64



American Scientific Products

TABLE OF CONTENTS

This manual contains instructions for operating Gravity Convection Ovens, Models DS-44 and DS-64. It also explains those service/maintenance procedures the operator can perform.

Most procedures, features and specifications for Models DS-44 and DS-64 are common to both. Where variances exist, they are noted.

	Page
SECTION 1.	
DESCRIPTIONS, FEATURES AND SPECIFICATIONS.	
1.1 Purpose And Description	1
1.2 Exterior Features	1
1.3 Control Panel And Keyboard Functions	2
1.4 Features And Specifications	5
 SECTION 2.	
UNPACKING AND INSTALLATION.	
2.1 Unpacking	6
2.2 Installation	6
 SECTION 3.	
OPERATING INSTRUCTIONS.	
3.1 Warning	7
3.2 Precautions When Operating	7
3.3 Power Failure	7
3.4 Circuit Breaker Protection	7
3.5 Damper Adjustment	8
3.6 Access Port	8
3.7 Oven Operating Procedures	8
3.7.1 Set-Temperature And Set-Time, Automatic Operation	8
3.7.2 Set-Temperature, Continuous Operation	10
3.8 Self-Protect Feature	10
3.8.1 Self-Protect Set-Temperature	10
3.8.2 Self-Protect Set-Timer	11
3.9 Self-Diagnostic Feature: Cause And Corrective Action	11
3.10 Trouble-Shooting	12
 SECTION 4.	
MAINTENANCE AND SERVICE.	
4.1 Battery Check	13
4.2 Battery Replacement	13
4.3 Observation Window Shield, Cleaning	14
4.4 Oven, Cleaning	14
4.5 Wiring Diagram	14
4.6 Replacement Parts List	15
4.7 Warranty Statement	16

LIST OF FIGURES

	Page
Figure 1. Exterior Features, Models DS-44 And DS-64	1
Figure 2. Control Panel And Keyboard, Models DS-44 And DS-64	2
Figure 3. Line Cord And Outlet	6
Figure 4. Circuit Breaker Switch	7
Figure 5. Damper Adjustment	8
Figure 6. Power Key	8
Figure 7. Set Temperature Key	8
Figure 8. Numeric Key Pad	8
Figure 9. Ent Key	9
Figure 10. Timer Console	9
Figure 11. Auto Start Key	9
Figure 12. Auto Stop Key	9
Figure 13. Meas Temperature Key	10
Figure 14. Cont Operation Key	10
Figure 15. Temperature Display/ Err	10
Figure 16. Timer Display/ Err	11
Figure 17. Temperature Display: SELF-DIAGNOSIS APPEARS HERE	11
Figure 18. Test Key	13
Figure 19. Battery Compartment	13
Figure 20. Circuit Breaker Switch	13
Figure 21. Wiring Diagram	14

SECTION 1. DESCRIPTION, FEATURES AND SPECIFICATIONS.

1.1 Purpose And Description

Two general purpose, gravity convection ovens regulated by accurate microprocessor. Ovens provide flexible programming and broad application. Used by a broad spectrum of industry for drying and curing a variety of substances and materials.

1.2 Exterior Features (Figure 1)

1. Exhaust Outlet And Damper Control
2. Shelves (2, Model DS-44; 3, Model DS-64)
3. Access Port
4. Oven Control Panel
5. Line Cord
6. Battery Compartment
7. Circuit Breaker

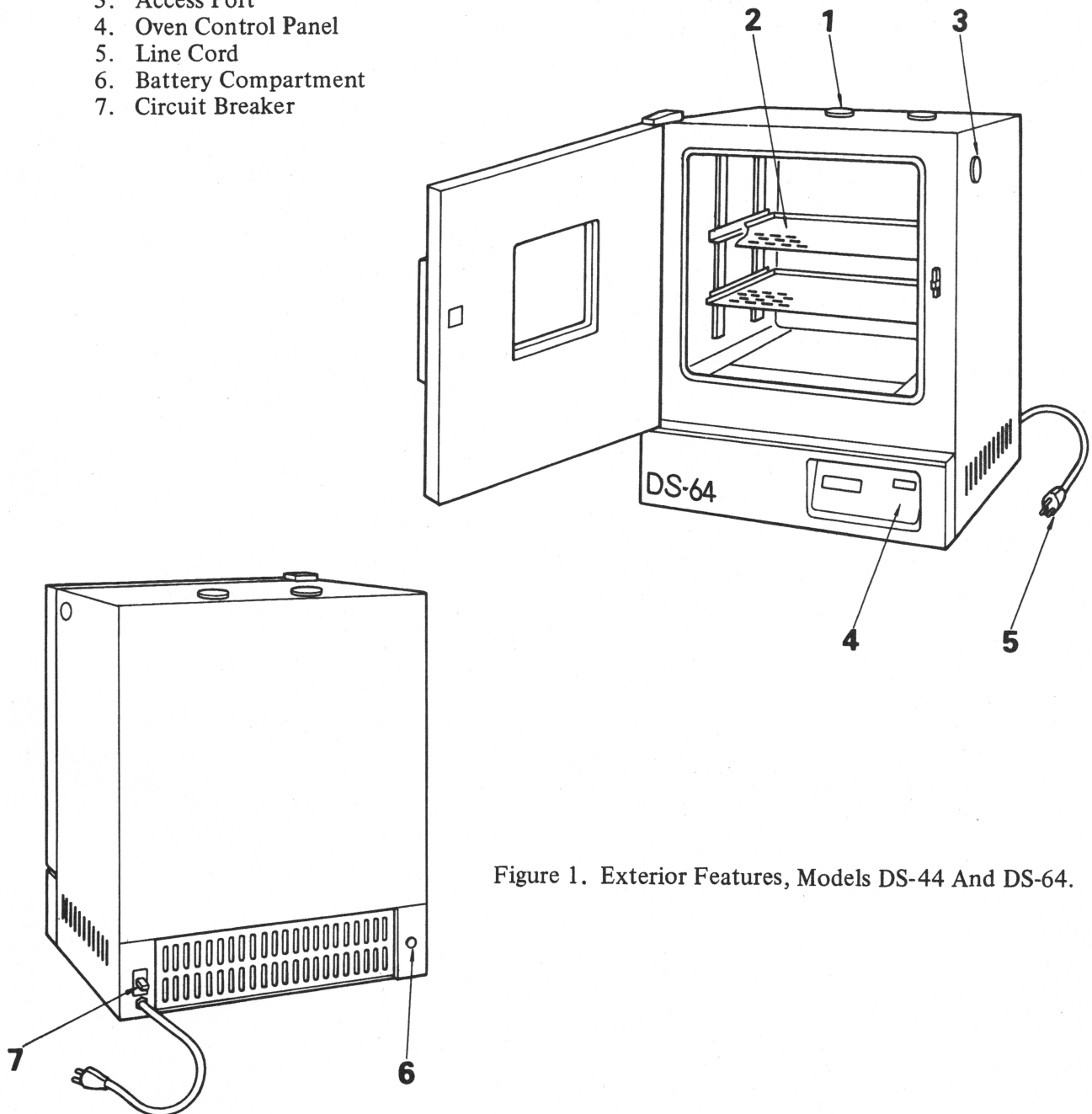


Figure 1. Exterior Features, Models DS-44 And DS-64.

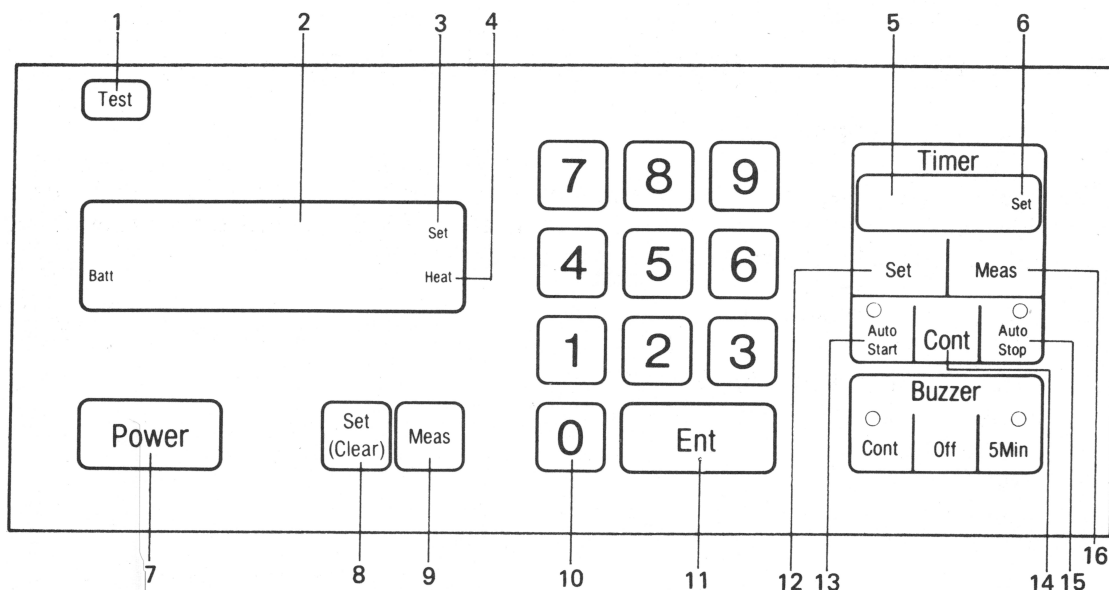


Figure 2. Control Panel And Keyboard, Models DS-44 And DS-64.

1.3 Control Panel And Keyboard Functions (Figure 2)

Explains keyboard and display functions of control panel, Models DS-44 and DS-64.

Table 1

KEY	FUNCTION
1. Test	1. Press Test to check “ready” status of microprocessor and battery. If $\angle \square --$ appears in temperature display, replace battery.
2. Temperature Display	2. Displays: a. set-temperature when Set temperature key (8) is pressed: b. oven temperature when Meas key (9) is pressed.
3. Set Temperature Indicator	3. Lights when Set temperature key (8) is pressed. Confirms that temperature shown on temperature display is set-temperature.
4. Heater Indicator	4. Lights, indicating oven is heating.
5. Timer Display	5. Displays: a. set-time; b. time remaining in set-time period when Meas key (16) is pressed.
6. Set Timer Indicator	6. Lights when Set timer key (12) is pressed. Indicates that time shown on Timer display is set-time.
7. Power Key	7. Controls power to all functions: microprocessor, displays, indicators and oven. Press Power to start all functions. When oven is on, press Power to stop all functions.

KEY	FUNCTION
8. [Set] Temperature Key	8. Multi-function key: a. [Set] temperature key must be pressed <u>first</u>, before entering temperature on numeric key pad (10). b. During operation, press [Set] temperature key to confirm set-temperature for operation. Set-temperature indicator (3) will light, also confirming set-temperature on display (2). c. [Set] temperature key is part of command sequence to operate oven's temperature mode. Key sequence is press: (8) [Set]Temperature; (10) Numeric Key Pad (set temperature); (11) [Ent] .
9. [Meas] Temperature Key	9. Press [Meas] to check oven temperature when pressed. Read oven temperature on display (2).
10. Numeric Key Pad	10. Temperatures and timings are set by pressing appropriate combination of keys.
11. [Ent] Key	11. [Ent] key is part of command sequence to set oven's temperature or timing modes. a. Sequence for set-temperature is press: (8) [Set]temperature key; (10) Set temperature on key pad; (11) [Ent] . b. Sequence for set-time is press: (12) [Set]timer key; (10) Set time on key pad; (11) [Ent] .
12. [Set] Timer Key	12. Multi-function key: a. [Set] timer key must be pressed <u>first</u>, before entering set-time on key pad (10). b. During operation, press [Set] timer key to confirm set-time. Set-time indicator will light, also confirming set-time on timer display. c. [Set] timer key is part of command sequence to set oven's timing mode. Key sequence is press: (12) [Set] timer; (10) Numeric Key Pad (set time); (11) [Ent] .
13. [Auto Start] Key	13. Press [Auto Start] to automatically heat oven to set-temperature, after timer has been set.

KEY	FUNCTION
14. Cont Operation Key	14. When not in Auto mode, press Cont to heat and operate oven, after pressing Power (7).
15. Auto Stop Key	15. Dual-function key. Press Auto Stop once and microprocessor automatically: a. Starts timing sequence, once oven reaches set-temperature; b. Turns oven off at end of set-time.
16. Timing Meas Key	16. Press Meas to learn time remaining in set-time period. Read time remaining on timer display (5).

1.4 Features And Specifications

Feature/Specification	Model	
	DS-44	DS-64
Capacity, Oven Interior (cubic ft.)	3.5	5.7
Dimensions, Exterior (mm)	560(W) x 640(D) x 830(H)	710(W) x 690(D) x 880(H)
Dimensions, Interior (mm)	450(W) x 490(D) x 450(H)	600(W) x 540(D) x 500(H)
Heater (kW)	1.3	1.5
Power Supply, 50/60 Hz.	115V/12A	115V/14A
Sensor	J Thermocouple	
Shelf Brackets	4	6
Shelves	2	3
Shelves, Load Capacity Each	15 kg	
Timer, Range	1 Min. to 99 Hrs. and 59 Min.	
Temperature, Accuracy Of Adjustment	$\pm 1^{\circ}\text{C}$ (at 260°C)	
Temperature, Evenness Of Distribution	$\pm 10^{\circ}\text{C}$ (at 260°C)	
Temperature, Operating Range	$40^{\circ}\text{C} - 260^{\circ}\text{C}$	
Temperature, Time To Maximum	Approx. 75 minutes	
Thermoregulator	Microprocessor, Proportional Derivative Control, Digital Setting And Display	
Weight, kg approximate	48	64
Window, Observation (mm) (reinforced glass)	250(W) x 280(H) x 3(T)	

SECTION 2. UNPACKING AND INSTALLATION.

2.1 Unpacking

When unpacking oven, do not throw packing material away until you check components against this packing list. Be sure you have:

Part	Model	
	DS-44	DS-64
Cabinet	1	1
Shelves	2	3
Shelf Brackets	4	6
Operator's Manual	1	1

Every care has been taken in the manufacture and packing of your oven. It was thoroughly inspected before leaving the factory. Nevertheless, be certain you receive all parts listed above, and examine for damage. Report any shortage or damage immediately to American Scientific Products.

2.2 Installation

1. Place oven on a sturdy table or bench, positioned with adequate clearance on all sides.
2. DO NOT install oven in environments where there is:
Inflammable Or Corrosive Gases;
High Humidity;
Ambient Temperature Above 35°C.
3. Install shelf brackets and shelves at desired heights.
4. Connect line cord to 115VAC single phase 15A source (Figure 3).

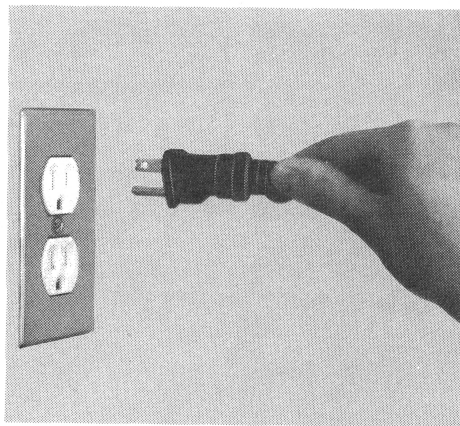


Figure 3. Line Cord And Outlet.

SECTION 3. OPERATING INSTRUCTIONS.

3.1 Warning

WARNING

Ovens Model DS-44 and DS-64 are NOT explosion-proof. Do not dry or cure flammable materials, or those with flammable vapor.

3.2 Precautions When Operating

1. Oven will not operate in excess of their 260°C maximum rating. If you set-temperature higher, temperature display will read *Err*. When display reads *Err*, press **Set** temperature key and enter new temperature lower than 260°C (3.7.1).
2. Specified shelf load capacity of 15 kg assumes equally distributed loads. Always distribute material evenly over shelf area.

3.3 Power Failure

1. In the event of power outage (even momentary), temperature/time are retained in microprocessor automatically by battery power.
2. When power is restored, oven returns to operation at temperature/time that were entered before outage.
3. If battery runs down during outage, temperature/time revert to "0", and oven operation stops.
4. To re-start oven if "3" occurs;
 - a. Reset circuit breaker (3.4).
 - b. Enter temperature/time again (3.7).
 - c. Remember to replace battery as soon as possible.

3.4 Circuit Breaker Protection

Models DS-44 and DS-64 are factory-equipped with a circuit breaker to protect high technology micro-processor and other electrical components in case of line surge. Always operate ovens with rear panel circuit breaker switch in "ON" (up position, Figure 4) to protect against line surge.

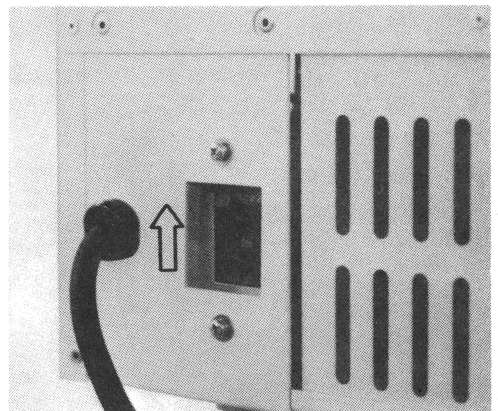


Figure 4. Circuit Breaker Switch.

3.5 Damper Adjustment

Set exhaust damper as necessary, depending on amount of material to be dried or cured (Figure 5). Small amounts require a 1/3 (approx.) damper setting. Regulate damper for larger amounts accordingly.

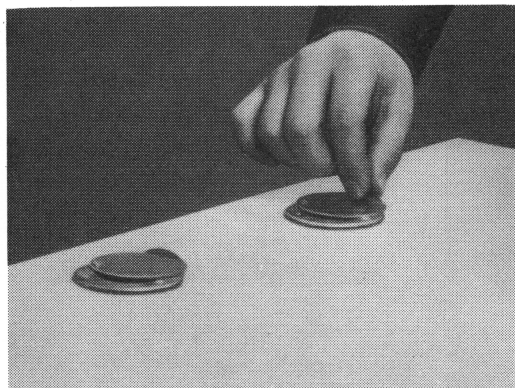


Figure 5. Damper Adjustment.

3.6 Access Port

For maximum utility, Models DS-44 and DS-64 have been designed with an access port (see Figure 1); e.g. operator can pass through line cord for power stirrer or thermal sensor.

3.7 Oven Operating Procedures

3.7.1 Set-Temperature And Set-Time, Automatic Operation.

1. Press **Power** (Figure 6). This starts all oven functions. Temperature display shows current set-temperature.

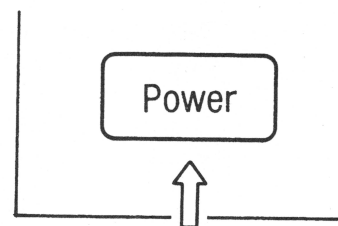


Figure 6. **Power** Key.

2. Press **Set** temperature key (Figure 7) to set-temperature for oven operation.

NOTE

Do not set temperature in excess of 260°C.

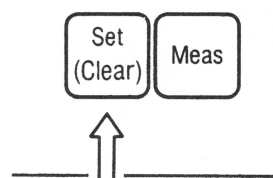


Figure 7. **Set** Temperature Key.

3. Then move to numeric key pad and enter selected temperature, e.g. 125°C: keys 1, 2 and 5 (Figure 8).



Figure 8. Numeric Key Pad.

4. Press **Ent** (Figure 9). This enters set-temperature in microprocessor memory.

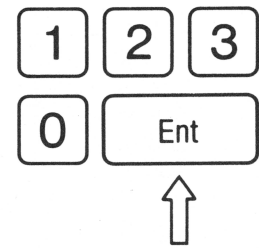


Figure 9. **Ent** Key.

5. Press **Set** time key to set-time for oven operation (Figure 10).
6. Then move to numeric key pad, and enter selected time, e.g. 6 hours and 30 minutes: keys 6, 3 and 0. (Figure 8).

NOTE

Do not set time in excess of 60 minutes in minute column.

7. Press **Ent** (Figure 9). This enters set-time in microprocessor memory.
8. Press **Auto Start** (Figure 11). This command automatically starts oven heating.

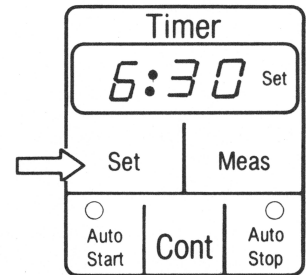


Figure 10. Timer Console.

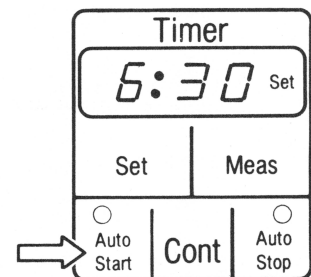


Figure 11. **Auto Start** Key.

9. Press **Auto Stop** (Figure 12). This command automatically:
 - a. Starts set-time sequence, once oven temperature reaches set-temperature.
 - b. Turns oven off at end of set-time.
10. Oven is now in **Auto** operation mode for set-temperature and set-time that you have programmed.

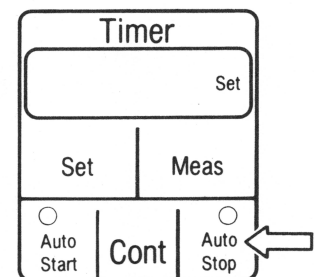


Figure 12. **Auto Stop** Key.

11. During operation to learn how much time of set-time remains, press **[Meas]** on timer console (Figure 13). Time remaining appears in timer display.
12. During operation to verify set-temperature, press **[Meas]** temperature key (Figure 14). Read temperature in temperature display.

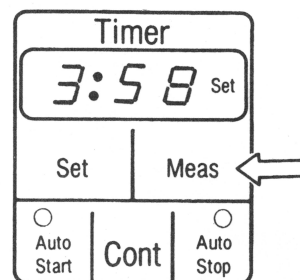


Figure 13. **[Meas]** Time Key.

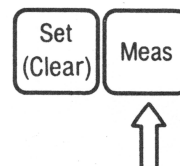


Figure 14. **[Meas]** Temperature Key.

3.7.2 Set-Temperature, Continuous Operation.

1. Press **[Power]** (Figure 6). This starts all oven functions. Temperature display shows current temperature.
2. Press **[Set]** temperature key (Figure 7) to set-temperature for oven operation.
3. Then move to numeric key pad and enter selected temperature, e.g. 125°C : keys 1, 2, and 5 (Figure 8).
4. Press **[Ent]** key (Figure 9). This enters set-temperature in microprocessor memory.
5. Press **[Meas]** temperature key (Figure 14) to learn when oven reaches set-temperature.
6. When oven reaches set-temperature, begin timing. Oven is in continuous operation mode. Use watch, clock or alternate means of timing.

CAUTION

Oven will continue to operate at set-temperature until you press **[Power]** (Figure 6) and turn it off.

3.8 Self-Protect Feature

3.8.1 Self-Protect Set-Temperature.

Ovens are equipped with a self-protect (SP) feature. They will not operate at set-temperatures in excess of rated 260°C capacity. *ErrD* is shown in temperature display Figure 15) when this occurs. To re-start, set temperature below oven's 260°C rated capacity (3.7.1).

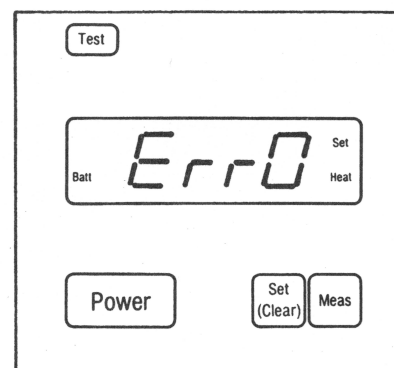


Figure 15. Temperature Display/ *ErrD*.

3.8.2 Self-Protect Set-Timer.

Ovens are equipped with a self-protect (SP) feature. They will not operate when set-times of 60 minutes or more are entered in minute column. *Err 0* is shown in timer display (Figure 16) when this occurs. To re-start, set time with less than 60 minutes in minute column (3.7.1).

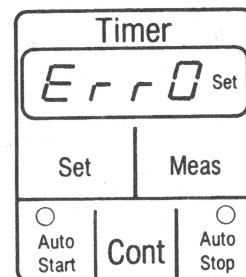


Figure 16. Timer Display/*Err 0*.

3.9 Self-Diagnostic Feature: Cause and Corrective Action

CAPTION: SELF-DIAGNOSIS APPEARS HERE.

Ovens self-diagnosis most malfunctions and report to operator with a message in Temperature Display (Figure 17).

Table 2 and Figure 17 show how message *Err* in combination with number 0 (see 3.8) 1, 2 or 3 appears in display. Message tells operator which infrequently occurring malfunction it may be and how to correct it.

Replacement Parts are listed in section 4.6.

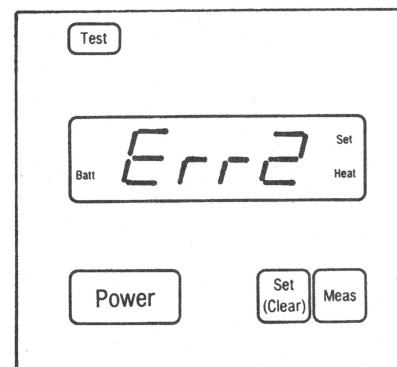


Figure 17. Temperature Display.

Table 2

NOTE: Ovens are programmed to sound buzzer and turn heater off when *Err 1*, *Err 2* or *Err 3* occurs.

TEMPERATURE DISPLAY READS	SUSPECT	CORRECTIVE ACTION
<i>Err 1</i>	Defective temperature sensor.	Replace sensor.
<i>Err 2</i>	Triac shortcircuit.	Replace thermoregulator.
<i>Err 3</i>	Defective heater	Replace heater.
	Heater circuit disconnected.	Connect.

3.10 Trouble-Shooting

Three occasionally encountered, and easily corrected, malfunctions are:

Table 3

Malfunction	Cause	Corrective Action
No response when Power key is pressed.	Line cord not connected, or loose.	Check line cord.
	Dead power line.	Check power supply fuse.
	Defective circuit breaker.	Replace.
	Defective thermoregulator.	Replace.
Temperature and time cannot be entered.	Defective thermoregulator.	Replace.
Oven will not heat.	Defective heater.	Replace.
	Defective thermoregulator.	Replace.

Replacement parts are listed in Section 4.6.

SECTION 4. MAINTENANCE AND SERVICE.

4.1 Battery Check

NOTE

In normal power situations, oven and microprocessor will operate without a battery in place.

Ovens are equipped with a battery to maintain microprocessor memory in case of a power outage. To check battery power, press **Test** key (Figure 18). If **Lo** appears in temperature display, battery should be replaced.

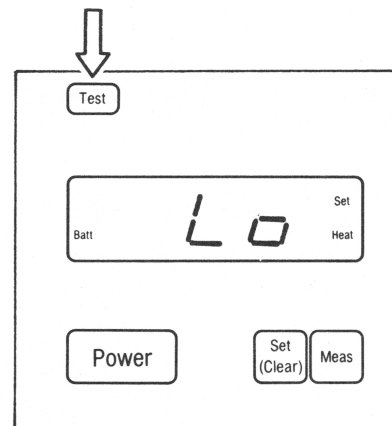


Figure 18. **Test** Key.

4.2 Battery Replacement

- Remove battery from battery compartment, exterior rear bottom (Figure 19).

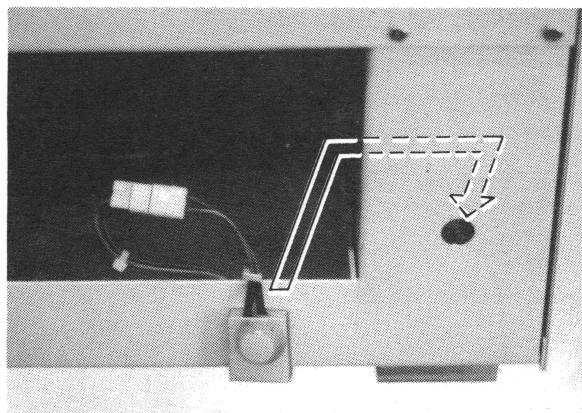


Figure 19. Battery Compartment.

- Install new battery (P/N DN-42-003, or equivalent). Be sure to match lead wire polarity (red +/green -) with that of battery terminals.
- Switch rear panel circuit breaker "ON" (Figure 20).

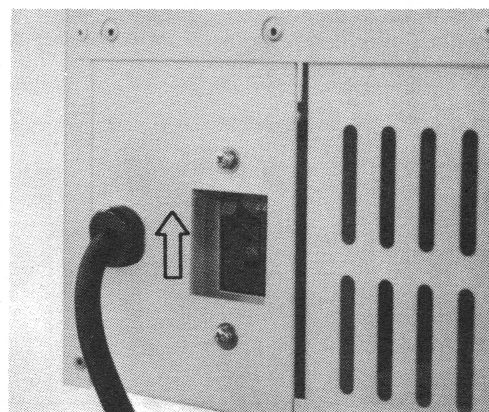


Figure 20. Circuit Breaker Switch.

4.3 Observation Window Shield, Cleaning

To clean reinforced glass observation window shield, always use a neutral cleansing detergent. Do Not use organic solvents.

4.4 Oven, Cleaning

Interior should be cleaned with organic solvent such as alcohol or the like.
After cleaning, do not use it until interior is naturally dried.
Exterior should be cleaned with neutral detergent.

4.5 Wiring Diagram

This wiring diagram identifies those parts in Ovens DS-44 and DS-64 that self-test (3.9) and can be "repaired" by replacement. Table below identifies parts by diagram symbol and part number (see list, 4.6).

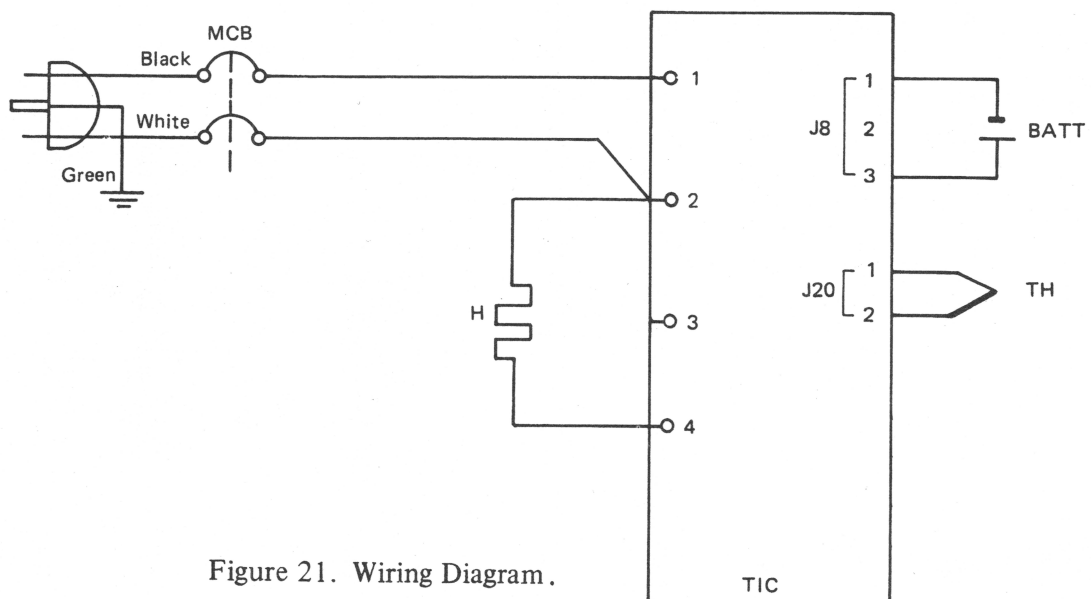


Figure 21. Wiring Diagram.

Symbol	Part	Part Number
BATT	Battery	DN-42-003
MCB	Circuit Breaker	
	Model DS-44	DN-42-002
	Model DS-64	DN-62-002
H	Heater	
	Model DS-44	DS-44-005
	Model DS-64	DS-64-005
TH	Sensor	DN-42-001
TIC	Thermoregulator	
	Model DS-44	DS-44-000
	Model DS-64	DS-64-000

4.6 Replacement Parts List

Part Number	Part	For Oven
DN-42-004	Door Gasket	Model DS-44
DN-42-010	Shelf	"
DN-42-009	Shelf Bracket	"
DS-44-005	Heater	"
DS-44-000	Thermoregulator	"
DN-42-002	Circuit Breaker	"
DN-62-004	Door Gasket	Model DS-64
DN-62-010	Shelf	"
DN-62-009	Shelf Bracket	"
DS-64-005	Heater	"
DS-64-000	Thermoregulator	"
DN-62-002	Circuit Breaker	"
DN-42-001	Sensor	Models DS-44/64
DN-42-011	Window Frame Packing	"
DN-42-012	Observation Window	"
DN-42-003	Battery	"

4.7 Warranty Statement

Warranty

American Scientific Products Division of American Hospital Supply Corporation does hereby warrant for a period of 12 months from date of delivery, under normal and proper usage, this product against defects in workmanship and material, and will repair or replace any defective part(s) without charge. This Warranty becomes null and void where purchaser or User has made (1) unauthorized repairs, or (2) improper installation, or (3) improper use or neglect of the equipment. Should repair or service of this product be necessary, it must be performed by repair and service personnel authorized by American Scientific Products.

To obtain the benefits conferred by this warranty, User must return the warranty card to American Scientific Products within ten (10) business days after receipt of the product.

American Scientific Products makes no other warranty of any kind whatever, expressed or implied, including merchantability and fitness for a particular purpose.

IMPROVED WARRANTY
24 Month Limited Warranty
Effective 4/1/92
- 24 Months for Parts
- 12 Months for Labor
- Excludes Door Gaskets
- Applies To U.S.A. Only

 **American Scientific Products**

第2版

8010330031